
AP Calculus
is fun!!!


No Calculators!

If $f(x) = e^{2\ln x}$,

find $f'(3)$.

6

The position of a particle moving along a straight line at any time t is given by $s(t) = t^3 + 9t^2 - 27$. What is the velocity of the particle at the time when the acceleration is zero?

−27

If $[x]$ represents the greatest integer that is less than or equal to x, find the value of

$$\lim_{x \to 0^-} \frac{1}{[x]}.$$

$$-1$$

What is an equation for the line tangent to $y = \tan^{-1} x$ at $x = \sqrt{3}$?

$$y-\frac{\pi}{3}=\frac{1}{4}\left(x-\sqrt{3}\right)$$

If f is a differentiable function and $f(0) = -1$ and $f(4) = 3$, then which of the following must be true?

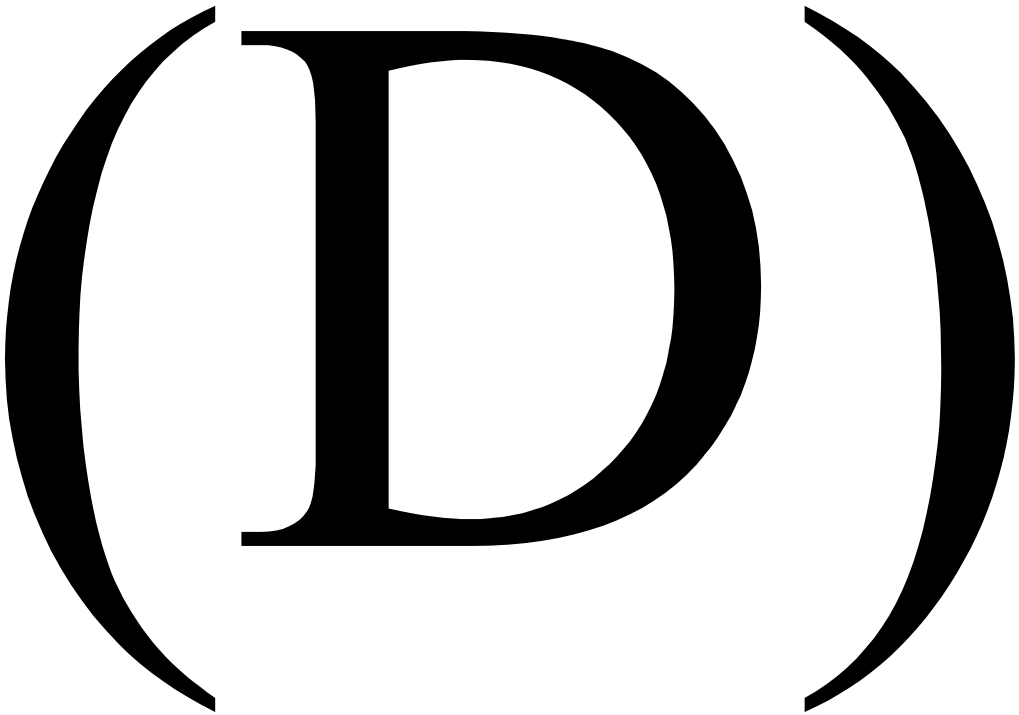
I. There exists a c in [0, 4] where $f(c) = 0$.

II. There exists a c in [0, 4] where $f'(c) = 0$.

III. There exists a c in [0, 4] where $f'(c) = 1$.

(A) I only (B) II only (C) I and II only

(D) I and III only (E) I, II, and III

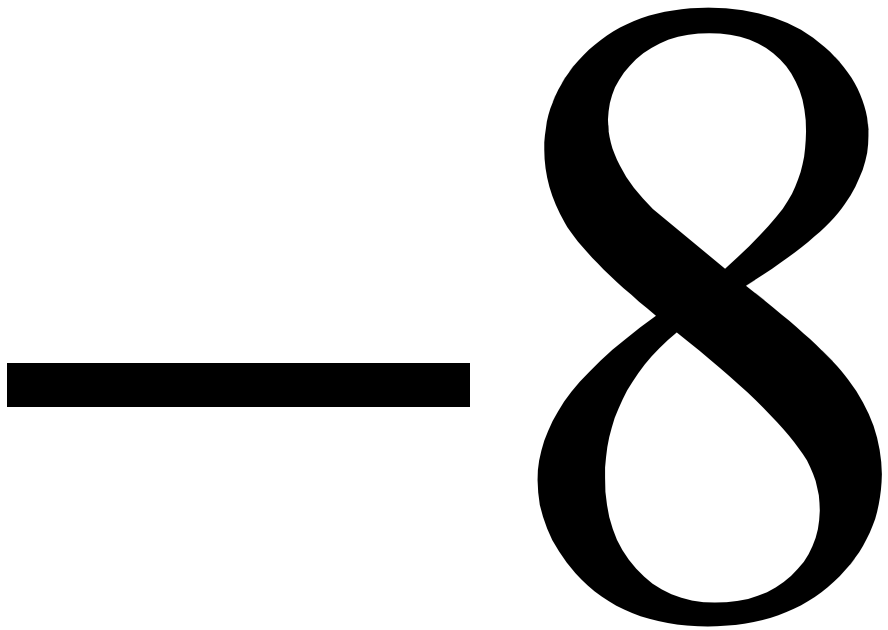


Suppose $f(x) = x^4 + ax^2$.

What is the value of a

if f has a local minimum

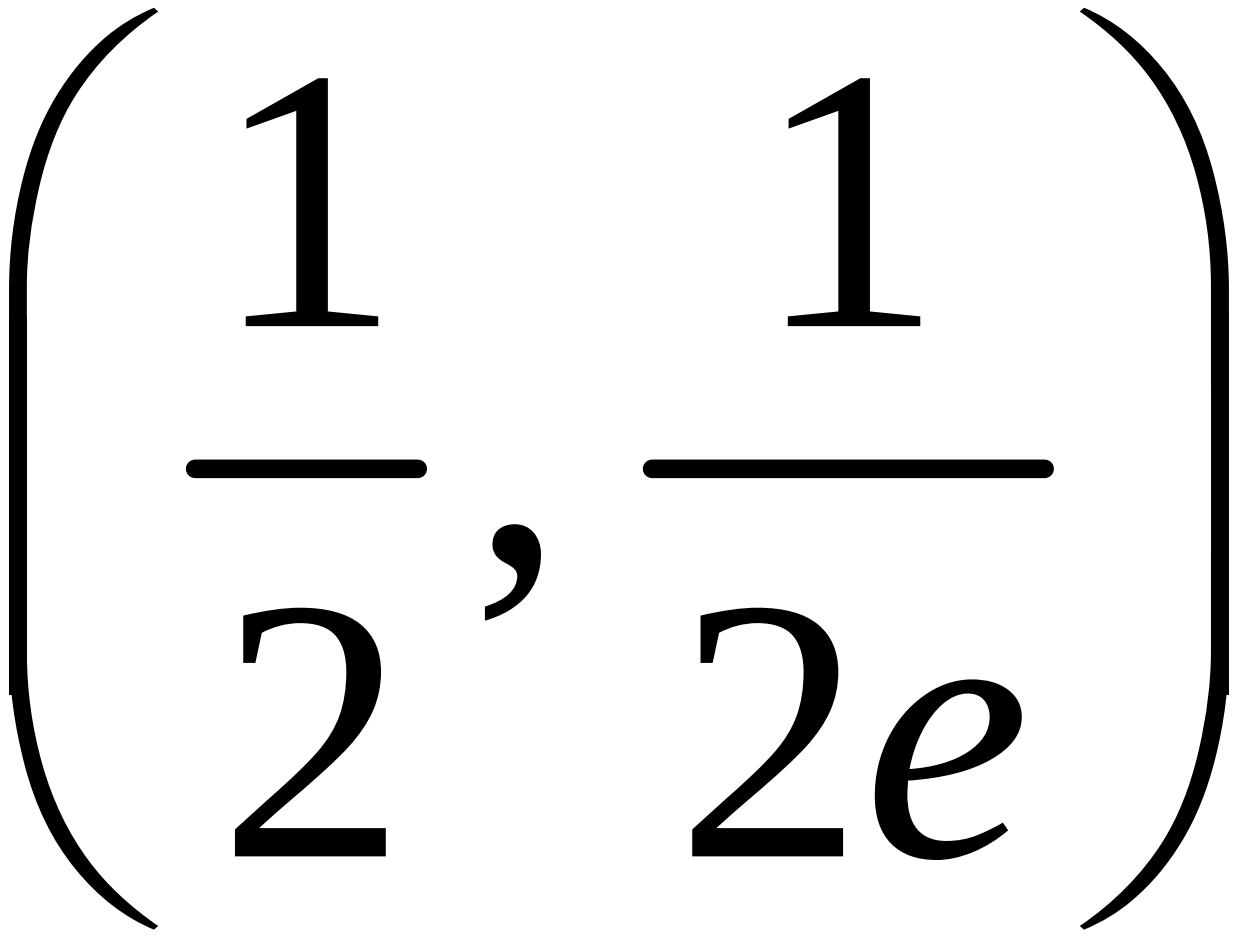
at $x = 2$?



If $y = e^{8x^2+1}$, find $\dfrac{dy}{dx}$.

$$16xe^{8x^2+1}$$

For what point on the graph of $y = xe^{-2x}$ is the tangent line horizontal?



What are the x-coordinates of the points of inflection on the graph of $f(x) = 3x^4 - 4x^3 + 6$?

0 and $\frac{2}{3}$

Evaluate: $\int_1^3 |x-2|\,dx$

(Use "geometry.")

1

If $y = \dfrac{3x+1}{x-1}$, what is $\dfrac{dy}{dx}$ in simplest form?

$$\frac{-4}{(x-1)^2}$$

What is $\frac{d}{dx}\int_x^2 \ln(1+t)dt$?

$$-\ln(1+x)$$

If $f'(x) = -5(x-3)^2(x-2)$, which of the following does the graph of $f(x)$ have?

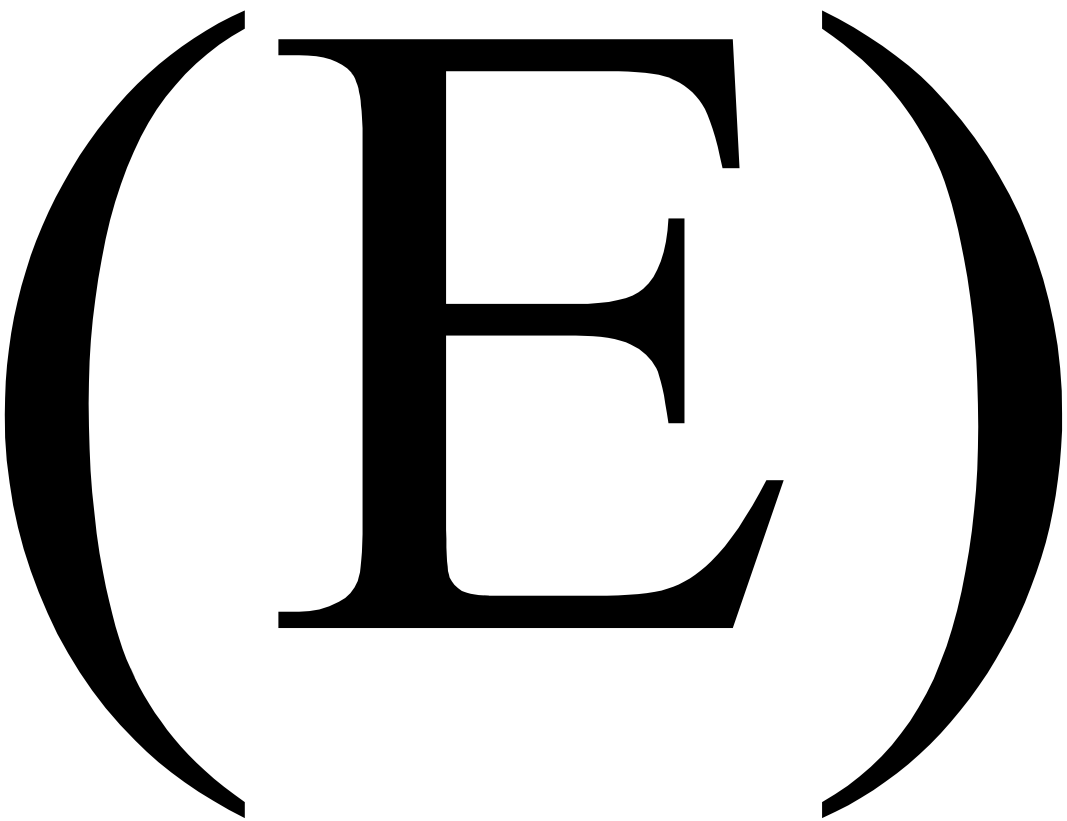
(A) a local minimum at $x = 2$ and a local maximum at $x = 3$

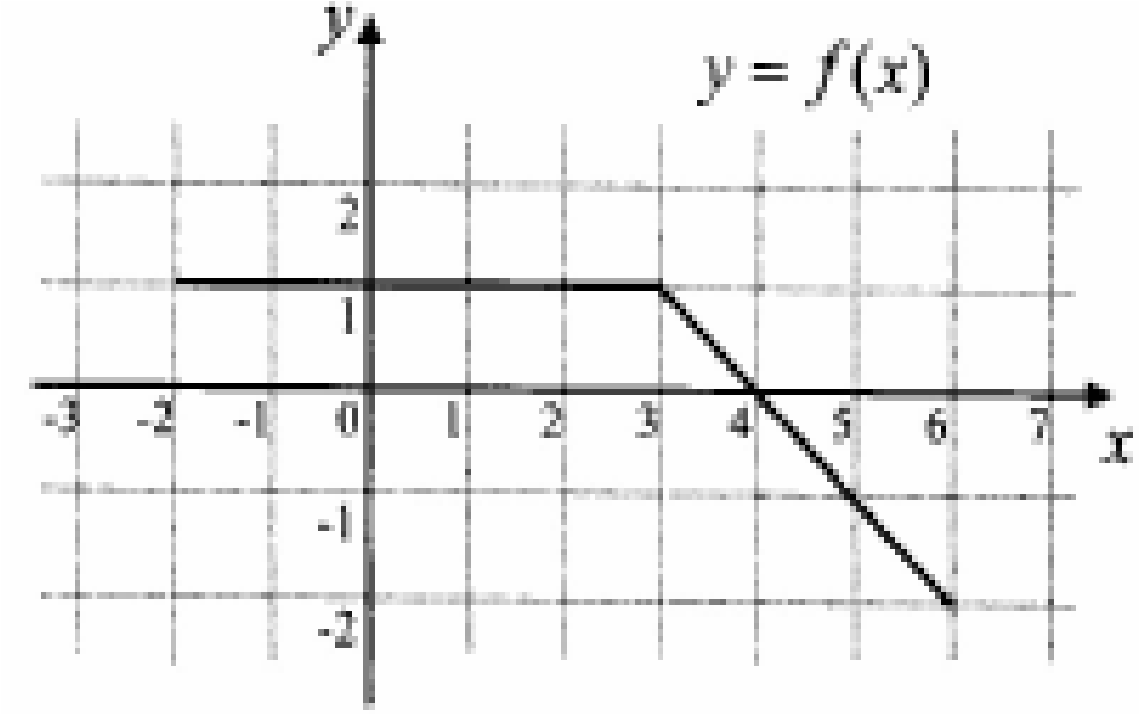
(B) a local maximum at $x = 2$ and a local minimum at $x = 3$

(C) a point of inflection at $x = 2$ and a local minimum at $x = 3$

(D) a local minimum at $x = 2$ and a point of inflection at $x = 3$

(E) a local maximum at $x = 2$ and a point of inflection at $x = 3$


(E)



The graph of $f(x)$, shown above, consists of two line segments.

What is the value of $\int_0^6 f(x)\,dx$?

$$1\frac{1}{2}$$

If $\int_1^k \frac{1}{\sqrt{x}}\,dx = 4$,

find the value of k.

9

The function $f(x) = e^{x\sqrt{3}} \cos x$ is defined on $0 \leq x \leq 2\pi$. On what interval(s) is $f(x)$ decreasing?

$$\frac{\pi}{3} < x < \frac{4\pi}{3}$$

If $\int_0^b f(x)\,dx = 3a$ and the graph of f is symmetric about the origin, find the value of $\int_{-b}^b f(x)\,dx$.

0

If $x + \sin y = \ln y$,

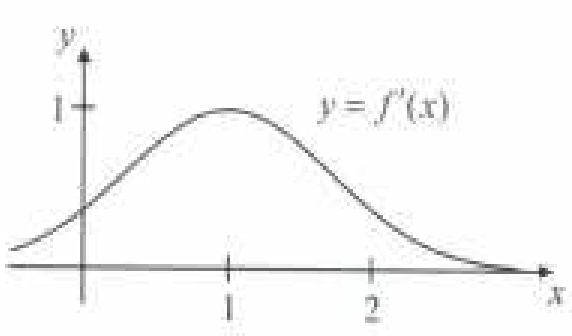
find $\dfrac{dy}{dx}$.

$$\frac{y}{1 - y\cos y}$$

x	1	2	3	4	5	6
$f(x)$	0.14	0.21	0.28	0.36	0.44	0.54

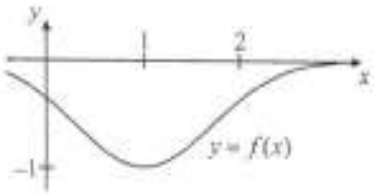
The table above contains values of a continuous function f at several values of x. Estimate $\int_2^5 f(x)\,dx$ using a trapezoidal approximation with three equal subintervals.

0.965

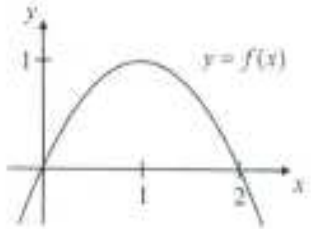


The graph of $f'(x)$ is shown above. Which of the following could be the graph of $f(x)$?

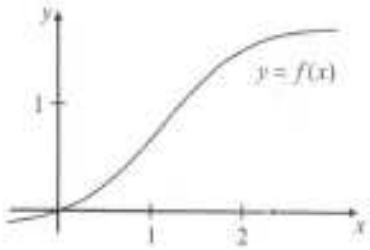
(A)



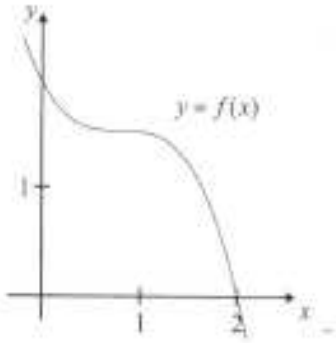
(B)



(C)



(D)



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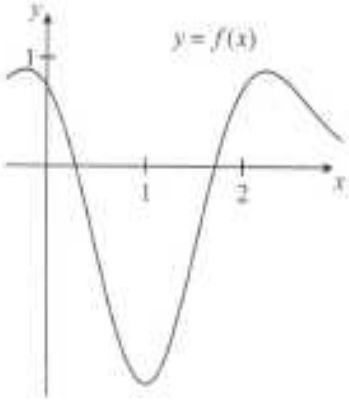
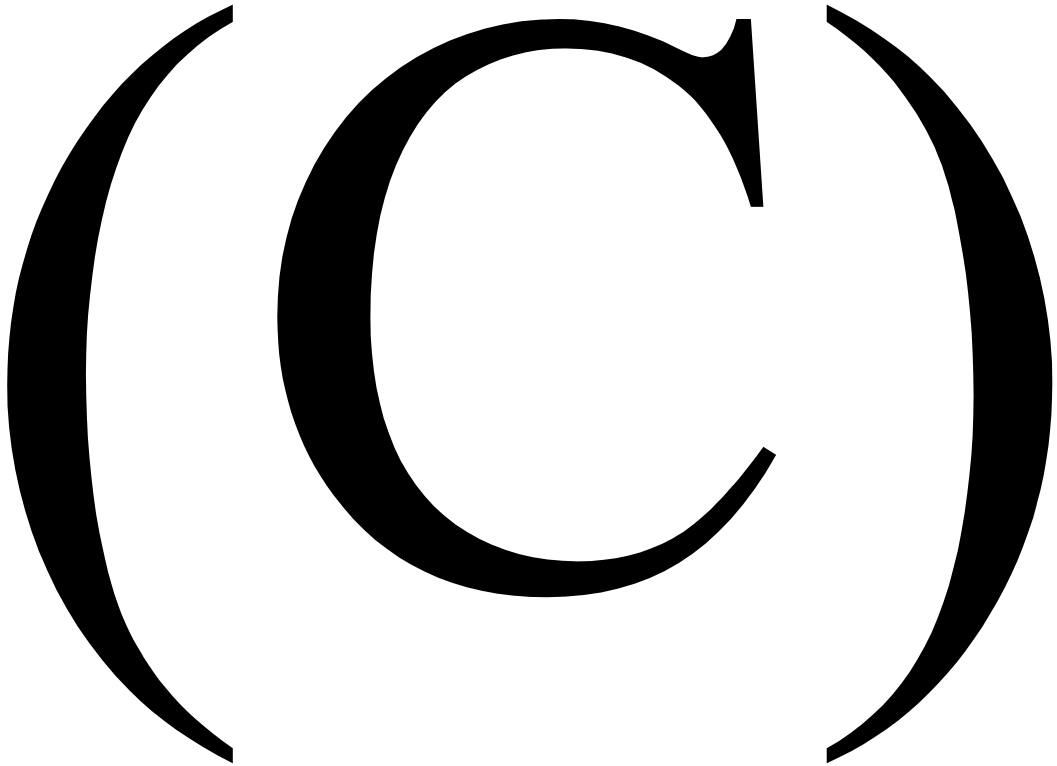
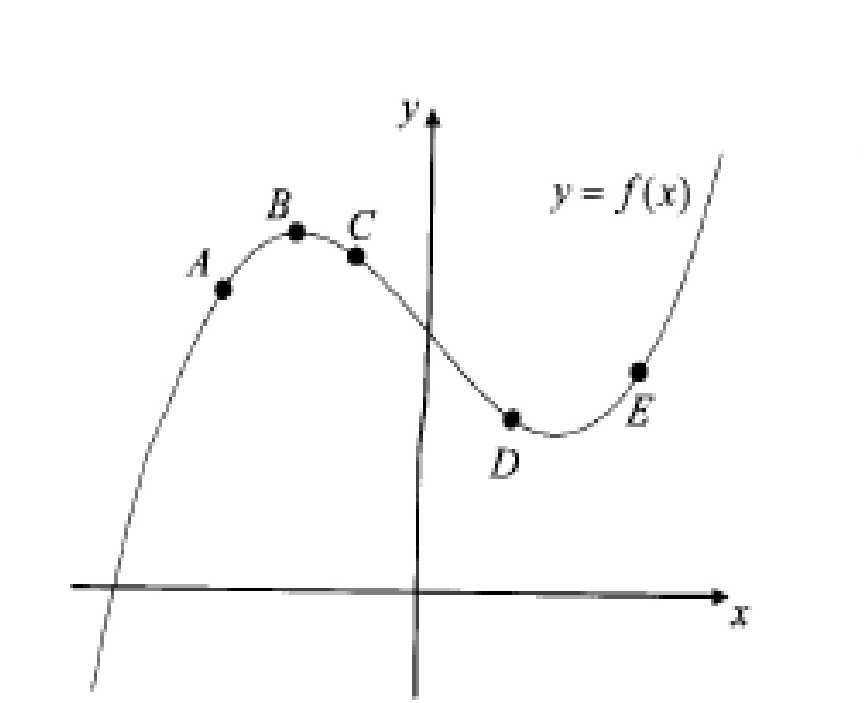
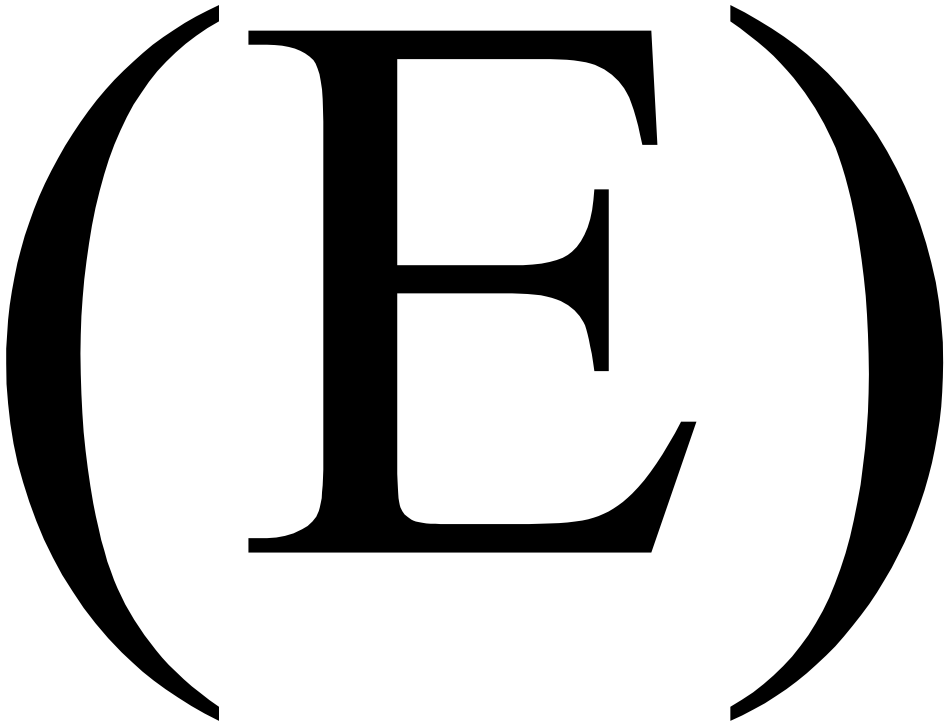



(C)



At which point on the graph shown above are both the first and second derivatives of $f(x)$ positive?


(E)

A particle moves along the x-axis with a velocity of $v(t) = \dfrac{3t}{1+t^2}$ for $t \geq 0$. Determine the maximum velocity of the particle.

Since $v'(t) = \dfrac{3-3t^2}{\left(1+t^2\right)^2}$ changes from positive to negative at $t = 1$, and $t = 1$ is the only critical number, $\boxed{v(1) = \dfrac{3}{2}}$ is the absolute maximum velocity.